Real-time Simulation and HIL Testing

Advanced projects require advanced tools for meeting and exceeding system-level requirements. By incorporating the most recent progress in engineering design technology, MapleSim® offers a modern approach to physical modeling and simulation. It dramatically reduces model development and analysis time while producing fast, high-fidelity simulations. MapleSim is a “white-box” Modelica® platform, giving you complete flexibility and openness for complex multidomain models. With MapleSim, you create, analyze, and run system-level models in a fraction of the time it takes with other tools.

MapleSim produces high-performance, royalty-free code suitable even for complex real-time simulations, including hardware-in-the-loop (HIL) applications. With MapleSim, you do not have to choose between model fidelity and real-time performance.

- The symbolic techniques that lie at the heart of MapleSim generate efficient system equations, without loss of fidelity, eliminating the need to simplify the model manually to reduce its computational complexity.
- Equation simplification steps include index reduction for DAEs, eliminating algebraic loops, and algebraically manipulating the system to produce a smaller, computationally simpler set of equivalent equations.
- MapleSim code generation tools convert these simplified equations to source code while applying symbolic optimization steps that dramatically speed up execution times. The optimizing tools extract common subexpressions and replace them with a single variable whose value is computed in advance. By removing expensive calculations from inside iteration loops, MapleSim can decrease the number of calculations for a single common subexpression from thousands to one in a typical application.
- Available code generation targets, using MapleSim or MapleSim with a connectivity add-on, include:
  - Standalone C code
  - Simulink®/Simulink® Coder™
  - LabVIEW™ and NI VeriStand™
  - dSPACE® (DS1104 controller board)
  - VI-CarRealTime™ framework from VI-grade
  - B&R Automation Studio Target for Simulink®
  - Functional Mockup Interface (FMI)
  - Maple™: You can speed up your analysis computations by running compiled MapleSim models from your analysis documents
- The resulting code can be seamlessly incorporated into popular real-time toolchains and other applications, royalty-free.
Add-on Connectivity Toolboxes

MapleSim Connector
Using the MapleSim Connector, high-performance, high-fidelity MapleSim models are automatically converted to S-Function blocks for seamless inclusion in Simulink® diagrams. The highly efficient S-Function blocks are suitable for fast execution within Simulink® and real-time implementation through Simulink® Coder™.

MapleSim Connector for LabVIEW™ and NI VeriStand™ Software
With the MapleSim Connector for LabVIEW and NI VeriStand Software, high-performance, high-fidelity MapleSim models are automatically converted to user code blocks for easy inclusion in your LabVIEW VIs and NI VeriStand Applications. The model code is fully optimized for high-speed real-time simulation, allowing you to get the performance you need for hardware-in-the-loop (HIL) testing without sacrificing fidelity.

MapleSim Connector for dSPACE® Systems
With the MapleSim Connector for dSPACE Systems, you can streamline your development process by automatically converting your high-performance, high-fidelity MapleSim models into real-time applications running on the DS1104 R&D Controller Board.

MapleSim Connector for VI-CarRealTime™
The MapleSim Connector for VI-CarRealTime allows you to incorporate high-fidelity, multidomain models created in MapleSim in the real-time vehicle simulation environment of VI-CarRealTime.

MapleSim Connector for B&R Automation Studio
With the MapleSim Connector for B&R Automation Studio, you can extend your B&R toolchain by integrating high-performance, multidomain system models from MapleSim into B&R Automation Studio.

MapleSim™ Connector for J MAG®-RT
The MapleSim™ Connector for J MAG®-RT allows you to combine the powerful finite element analysis (FEA) abilities of J MAG with the advanced physical modeling approach of MapleSim to produce high-fidelity system models that seamlessly incorporate components from each system.

MapleSim Connector for FMI
The MapleSim Connector for FMI allows you to share high-fidelity, multidomain models created in MapleSim with other modeling tools. FMI (Functional Mockup Interface) is a standard format for defining models established with the support of the Modelica Association to facilitate the sharing of models across different tool sets.

For More Information
Visit www.maplesim.com for product information, application stories, demo videos, a model gallery, and more.

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